# Molecular detection of *Toxoplasma gondii* from a naturally infected Alpine chamois (*Rupicapra r. rupicapra*) from Italian Alps

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## Background

The protozoan *Toxoplasma gondii* affects many species of domestic (1; 2) and wild (3; 4; 5) warm-blooded animals, raising public health issues related to its zoonotic potential. In this sense wild ungulates may therefore be a source of *T. gondii* infection for consumers (raw, undercooked meat and fresh sausages) (6; 7; 8) and for hunters and slaughterers through manipulation, evisceration and handling of carcasses (9; 10; 11).
Alpine chamois (*Rupicapra r. rupicapra*) is the most hunted wild ungulate in the Italian Alps with a significant increase of density in the last decades (12); as positive results of serological testing for *T. gondii* have been reported in the population from the Italian Alps (13; 14) and in southern chamois (*Rupicapra pyrenaica*) from Spanish Pyrenees (6), we investigated the presence of the protozoan DNA in brain tissues in order to define the receptivity of this species to *T. gondii* infection and its role in the protozoan lifecycle.

## Materials and methods

During the hunting season 2011, 11 samples of chamois brain tissues were collected in the Lepontine Alps (VB). DNA extraction was performed with the QIAamp DNA Mini Kit (Qiagen, Italy). All the samples were assayed by targeting a 529 bp non-coding region (15), then the positive one was confirmed by a PCR-RFLP assay targeting the 18S small-subunit ribosomal gene of *T. gondii*, using primers that identify also *Neospora caninum* and *Sarcocystis spp.* (16).

## Results and Discussion

*T. gondii* DNA was detected in a six-year-old male chamois hunted at an altitude of 1700 m.a.m.s.l.. The subject was in a good body condition and its behaviour was normal; the post-mortem examination did not reveal any systemic macroscopic lesions.
The protozoan DNA was detected by both PCR protocols. The PCR-RFLP restriction enzyme analysis of the amplified product confirmed the presence of *Toxoplasma gondii,* excluding eventual cross-reactions with *N. caninum* and *Sarcocystis spp.*, closely related to *T. gondii*. As far as we know, this is the first detection of *T. gondii* DNA from Alpine chamois.
This result confirms the Alpine chamois as intermediate host of *T. gondii* and demonstrates the protozoan presence in the Alpine ecosystem, even in remote areas.
Considering the sporadic presence of linx in the Italian Alps, feral cats are the only definitive hosts of *T. gondii,* even if transplacental transmission can not be excluded. The impact on chamois population dynamics can not properly be evaluated without a better understanding of the

epidemiology of infection. In addition, the consumption of raw or undercooked chamois meat could be a possible source of *T. gondii* infection in humans. In particular, the fact that *T. gondii* usually affects the host without producing clinical signs (17) could increase the risk of human infection ascribed to the apparent healthiness of chamois meat.

**Perspectives and future research priorities**

Further analysis are needed to define the epidemiology of *T.gondii*, in particular performing serological study of antibodies against the parasite and the genotyping of the present and future PCR positives samples in order to define (a) prevalence of *T. gondii* infection in Alpine chamois populations, (b) which parasite strains are circulating in this alpine ruminant, (c) its pathogenicity and the related zoonosis risk.

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